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POLICY PLANNING FOR TECHNICAL INFORMATION IN INDUSTRY

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(Talk given at symposium, "Documentation Planning in Developing Countries" co-sponsored by the Committee for Developing Countries, of the International Federation for Documentation (FID/DC) and the German Foundation for Developing Countries, Bonn, in Bad Godesberg, Federal Republic of Germany, 29 November 1967)

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I have been asked today to lead a discussion on documentation planning for industry in developing countries. My talk will be in three parts. In the first of these I will discuss the policies and the mileu needed for innovative, technological industry to flourish; in the second I will report on recent studies of how scientists and engineers in industry go about getting the information they need to do their jobs, and in the third part will mention certain practical aspects of operating documentation or information systems in industry.

You will find only a few passing references to the problems of developing countries as such. I am reasonably familiar with the problems of developing industry, and of developing documentation systems in a fairly advanced country which shares a fervent belief in free enterprise with an equally fervent belief in anti-trust laws, and Federal sponsorship of research and development. I hope others will speak equally freely of the problems in their countries.

I Management of research and development in industry

I assume that the primary purpose of documentation in industry is to serve research and development, and that the primary purpose of research and development is to serve the needs of the industry which employs it. This part of my paper will be concerned with the problems of industry first, and research and development second. The latter parts of the paper will discuss documentation more specifically, but I think it important to place documentation in context. I will be talking primarily about manufacturing industry, but I would assume that certain of the things I have to say, perhaps with a different time constant, would apply equally well to such industries as transportation or electrical power.

Just what does manufacturing industry do? In the broadest scope, manufacturing is concerned with the conversion of matter and energy

into useful products for markets. It encompasses those phases of industrial operations that deal in volume with the preparation of raw materials, conversion into useful shapes, processing into products and devices, and assembly into complex systems.

A company can grow and become more successful by pursuing some combination of the four courses which are available to it. First, it can improve its profitability by reducing costs, second, it can expand its penetration in the markets it is already in with products it already has. Both of these options require a continuing evolutionary improvement in the quality of its products in order to meet ever more intense competition. Third, the company can grow by creating new products to serve its current and immediately accessible markets. Finally, the company can grow by successfully creating completely new business based on technology which it creates itself or acquires. The fourth option carries with it the potential for the greatest growth and also the greatest potential for failure.

Applied research in manufacturing technology is generally directed toward accomplishment of the following objectives: (a) manufacturing procedures to attain new specifications and performance standards; (b) improvement in quality, reliability and uniforminity of final output; (c) decrease cost of manufacturing operations.

Improvement of any of these activities implies dissatisfaction with the status quo. The next part of my discussion is based on the assumption that somewhere in both line and staff management of a company are individuals who want to change the status quo. There are at least five sorts of research activities these individuals may engage in. (1) Science oriented research - this is research done in order to increase the amount of knowledge about a field of science, a phenomenon or a material. Although it is usually in subjects related to current or potential commercial activity of a company, it is not directed towards any specific new process or product. This kind of research may be indistinguishable from basic research done in universities. (2) Process oriented research - the objective is to decrease the cost and improve the efficiency of making a known product from an available raw material. It may and often does involve novel technology. (3) Raw material oriented research - the objective is to increase the value of products or raw materials available to the company by transforming them into new and more valuable products. (4) Product oriented research - the objective is to find alternate and wider uses for existing products and to find new products that will be better than those available for existing applications. (5) Customer oriented research - the objective is to find products to add to those already sold to existing customers.

Harvey Brooks of Harvard University has pointed out (1) that there are certain identifiable characteristics of successful mission oriented laboratories that seem to be independent of whether they are located in government, industry or universities. Some of these characteristics are listed below.

1. Full awareness and general acceptance of the principal goals of the organization by its key people.

2. Willingness to consider and implement new ideas and initiatives on their own merits regardless of the organizational level at which they originate or whether they come from inside or outside the organization.

3. Mobility of people between the more fundamental and applied activities of the organization.

4. Quick recognition and funding of new ideas at least to the point of ascertaining the desirability of a larger commitment.

5. Extensive freedom at each organizational level in the organization to reallocate the resources within the relevant area of responsibility.

6. Full communication through stages of the research and development process from early research to ultimate user.

7. A good organizational memory for the enduring technological problems and means related to the broad mission of the organization or laboratory. Professor Brooks goes on to point out that it is this organizational memory, of which I will have more to say later, that most distinguishes the mission oriented laboratory from a university or basic research laboratory. In basic research memory and continuity tend to be deposited in the scientific literature and professional communications system rather than in a particular organization.

8. A system of recognition and reward that assigns highest significance to technical contributions to the goals of the organization.

There is a marked difference in the extent to which companies in various industries engage in research and development activities. A study carried out by the National Science Foundation of the United States shows that in January 1965 - 346,300 scientists and engineers were employed in research and development. Almost one-third of these, 101,200 were employed in the aircraft and missile industry; only 500 were employed in the lumber, wood products and furniture industry. This

distribution of effort is set forth in the following table:

TABLE I (2/)

Lumber, wood products and furniture	500
Textiles and apparel	1,200
Non-ferrous and other metal products	2,300
Paper and allied products	2,600
Primary ferrous products	3,000
Miscellaneous manufacturing industries	3,500
Stone, clay and glass products	4,900
Food and kindred products	5,600
Rubber products	5,600
Fabricated metal products	6,800
Miscellaneous chemicals	7,200
Drugs and medicines	7,600
Optical, surgical, photographic and other instruments	7,600
Petroleum refining and extraction	8,900
Scientific and mechanical measuring instruments	8,900
Nonmanufacturing industries	10,500
Motor vehicles and other transportation equipment	24,700
Industrial chemicals	26,200
Non-communication electrical equipment	32,200
Machinery	32,600
Communication equipment and electrical components	42,6[illegible]0
Aircraft and missiles	101,200

I am not suggesting that this pattern of allocation of research and development manpower is necessarily an ideal allocation of a nation's resources. I could even argue that this in fact constitutes a reverse list of priorities for developing countries. One of the standard questions in manufacturing is "make or buy". Is it cheaper and/or better to make an item in your own shops or to purchase it from an outside, specialist supplier? I would imagine that the same question might well face the planners of a developing country--whether to make their own technology, or but it from an outside supplier? This list does, however, indicate the relative importance of innovation in various industries and, in effect, the price that a nation has to pay in research and development manpower if it is to assume a commanding role in a particular industry.

You should be reminded, however, that there is more to industrial success than research and development. A study recently carried out among 100 graduates of an executive development program in Peru (3/) showed that these managers thought that the major obstacles to

industrial development in Peru were finance, followed by production and sales, and the two most important problems facing Peruvian industry were the limited extent of the national market, and the amount of competition already in the market.

And the International Computation Centre in Italy, in a recent announcement of a major policy change (4/), wrote:

"One of the crucial elements of current economic and social evolution is the impact of technology. There are however increasingly wide differences in the manner in which countries take part in technological progress. Both in the measures that they contribute to it and the benefits that they obtain ... It seems common sense to say that adequate participation in technological evolution by any country. commensurate to its means and problems, requires the formulation and implementation of an autonomous national technological policy as well as the coordination at regional and possibly world levels of such national policies."

"Some countries which possess valuable technological assets are puzzled by the insufficient interest that others display in strengthening ties with them in order to share in the exploitation of such assets by offering something in exchange. Underdeveloped countries start resenting the fact that technological progress is not just a question of availability of capital equipment, as soon as they are faced with their incapacity to exploit the expensive machinery that they have imported, either with great strain on their foreign exchange or through foreign aid. Too many industrialists limit their interests in the benefits that modern technology can provide to the acquisition of know how and patents, as well as fragmentary government subsidies but are neither able nor willing to change the organizational structures and managerial practices that technological evolution requires, nor to inform and inspire politicians to take a consistent course of action which is of general interest. Finally, too few political and industrial leaders appreciate the fact that technology has got beyond the stage in which share access, in the form of documentation and absence of legal restrictions, is a sufficient cause for its utilization; that nowadays any successful attempt to import technology requires from the recipient a major effort towards developing a context in which such technology can be used, which in a way means contributing to the technology itself."

II Information transfer in industrial research and development

But let us set aside for the moment the questions of research and development policy, and the even weightier problems of a national policy to encourage industrial development and technological innovation, and ask: How do scientists and engineers in industry get the information they need to have to do their jobs?

The traditional approach has been through the study of library records, such as the circulation of books and periodicals. In recent years, at least in the United States and the United Kingdom, the tendency has been to study all aspects of information transfer within a given setting, with the library treated as just one information resource among many. Needless to say, these studies tend to be carried out by sociologists or psychologists, anybody but librarians or documentalists.

One of the most recent of these studies has been reported by Richard Rosenbloom and Francis Wolek, of the Graduate School of Business Administration of Harvard University (5/). The authors studied 2,000 scientists and engineers in 13 establishments of four large corporations, and 1,200 members of the Institute of Electrical and Electronic Engineers. The authors made the following generalisations:

1. The transfer of technical information is primarily between people.

2. The most used sources of information are local, and within company.

3. Self-reliance--or, perhaps, self and group-reliance--characterise acquisition of technical information.

4. More than one-third of the instances of acquisition of information ensue without a specific search for the information acquired; chance acquisition of information (and living in an information-rich environment--h.w) is significant in this part of the information transfer process.

5. The incidence of specific search falls as job rank rises.

6. Use of sources within the same company varies directly with seniority.

7. As technology becomes more applied, there is an increased reliance on interpersonal channels, less use of published documents and a corresponding increase in the relative reliance on unpublished written sources; a greater incidence of the acquisition of information through specific search; and less use of sources external to the company.

8. In cases where the technology is rapidly changing or is broadly based, engineers are less able to depend, and hence actually depend less, on personal experience and local expertise for needed information.

9. The beliefs of the local engineering staff with respect to the value of knowledge and of professional activities are a major determinant in the pattern of information flow.

What were some of their specific findings?

The sorts of literature used by scientists and by engineers differ markedly. Among scientists they are almost entirely made up of articles and books which constitute the "professional" literature. Among engineers the use of these professional sources is matched by the use of information from trade magazines, commercial catalogs and technical publications, and technical reports of other organizations.

Scientists tend to make substantially more use than do engineers of sources outside the corporation, a difference which is especially marked in respect to the use of professional journals and books. Among scientists, sources within their own corporation provide information in only one-third of the instances, as opposed to the strong majority, typically 50 to 70 percent, of the instances reported by most groups of engineers.

Substantial differences occur between those working in central laboratories of a corporation and those working in operating divisions. Engineers and scientists working in central laboratories tend to use sources outside their own corporation; this situation is reversed in operating divisions, where from three-fifths to three-quarters of the responses cite sources within the same firm.

Engineers and scientists with a high commitment to development of personal skills, as shown by reading professional publications, joining professional societies and attending their meetings, use professional journals and other published documents considerably more often, and use local sources of information less, than is true of the average scientist or engineer.

Men in the life sciences and in chemistry seem to make greater use of the formal literature than do physicists and mathematicians. Interpersonal communication with sources outside their own firms seems more common among life scientists and computer scientists than among chemists or any of the engineering groups. Chemical and metallurgical engineers report a greater use of professional documents and a lesser reliance upon sources within their own firms than do mechanical and electrical engineers.

About half (55 percent) of the interpersonal exchanges within a firm leading the user to a source of information were provided by other scientists and engineers, but a surprising 41 percent came from non-technical employees. An even more surprising 4 percent were furnished by librarians or other staff in an information center!

Perhaps this 4 percent figure should be surprising because it is so large. In a British study (6/), 600 scientists using one of 25 selected libraries were asked where they had found reference to details of the literature. In 33 percent of the cases cited, the source of the discovery was a colleague's recommendation; 1 percent had their attention drawn by library staff. The same men, and these were library users, mind you, asked to rank twelve ways of getting information in order of usefulness, ranked using the library card index as eleventh, and asking the librarian as twelfth.

But before you get too indignant about the slothful and decadent ways in which scientists and engineers gather information, let me remind you of a study recently carried out on how science information specialists gather information. (7/). The authors asked 127 science information specialists such questions as:

"What do you need to know about the field of science information itself in order to perform your duties in a scientific information service? What other things do you need to know about the science information field that you seem unable to find? What sources are helpful to you when faced with problems related to your work? What sources have you thought should have been helpful but which have actually turned out to be disappointing? Are your sources of information good enough to enable you to detect changes and keep abreast of trends so you can adequately plan for your professional duties or do you need something else? How and where do you acquire information about the latest developments and concepts procedures, services and equipment coming from research and development people? Is there enough of it? Or do you need some more?"

Would it startle any of you who have come to this meeting to learn that "science information specialists seem to prefer direct contact with people as their primary source of obtaining information about their own field."? Face to face consultation at one another's place of business, telephone conversations, and the informal discussions that take place between and after formal sessions at conferences are preferred to any other method. Time and time again the interviewees expressed the feeling that their particular situation was unique and that they needed the opportunity to discuss their particular problems at some length with people of other organizations who may have experienced similar problems. Many respondents felt that formal conferences and serial publications are much too theoretical and do not attack the practical problems which science information specialists constantly face. The informal discussions at professional conferences were considered highly profitable while the quality of the delivered papers during the formal presentations were unacceptable by many.

One other inclusion of this report seems appropriate for quotation at this meeting. "There is wide spread disbelief that the claims made from many equipments and systems advocated for use in the information sciences field are even partially accurate. Many centers, especially those in the possession of industry, do not dare reveal their true cost or their efficiency (their managements would summarily scuttle them!). Hard data is badly needed to evaluate the efficacies of various alternatives. Our informants believe, probably correctly, that most information centers and services are founded, operated and supported by individuals who are so blindly partisan that they couldn't see a contrary fact if it were pasted on their nose."

III <u>Responsibilities of the documentalist in industry</u>

What are the responsibilities of the documentalist, or scientific and technical information specialist, or information scientist in industry--say the man who is hired to set up a special library and/or information centre in an industrial firm which has never had either a documentalist or a document collection?

I think that his first task, which is fairly easy but all too often ignored, is to find out what products the company makes. After that, he should try to find out what products it is planning to make next year and the year after that. The more he knows about his company, the better he will be able to serve the mission of the company by the documents he acquires, and the services he offers.

Another important role, all too often ignored in conventional librarianship, of the technical information activity in industry is to act as the organizational memory which Professor Brooks refers to. The most expensive information which any laboratory acquires is that which is bought by the effort of its own staff members. All too often this information stays locked up in their heads or their desk drawers to be lost forever when they leave the organization. Institution of a proper project information report system and proper files governing those reports should be one of the early responsibilities of a new information activity in an industrial organization.

Engineering drawings and change orders are an equally important part of this organizational memory. In the past, I am afraid, libraries have tended to let other activities in the organisation handle engineering drawings because of their physical bulk which makes them a nuisance to file. One of the several advantages of newer systems for handling engineering drawings on microfilm aperture cards is that they make it physically possible to store these with project reports as part of the organisational memory.

The documentalist in industry is given a certain amount of money each year. He has to decide how to use these resources to help his firm meet its objectives. Certain charges may be made on his budget for space, occupied, for heat, light and the like. There isn't much that can be done about these. His professional judgement comes in when he has to decide whether to spend his money to buy sources of information--books, periodicals and the like, or to hire people to provide services.

Let me cite the two boundary conditions. It would be possible, although hardly advisable, for a manager to turn his entire library budget over to a commercial book-seller, and let the office boy open the crates of incoming books for the users to paw through. The other, equally unattractive, alternative is to spend all your money for salaries, and let your people spend their time trying to borrow books from other libraries and documentation centers!

I have tried to list, in Table II, the possible sources of information, and in Table III the services it is possible to provide.

TABLE II (7/)

SOURCES OF INFORMATION

Books

Periodicals

- Learned journals published by professional societies
- News journals published by societies
- Learned journals published by commercial publishers
- Trade journals by commercial publishers
- House journals
- Abstracting and indexing journals
- Reviews of "advances"

Technical documentary reports

- External (usually government sponsored)
- Internal - company proprietary

Trade literature

Conference papers

Patents

Standards (e.g., official specifications)

Miscellaneous

e.g., films, illustrations, phonograph records, spectra, maps, and even samples of physical specimens, such as plants (herbaria) and fossils.

TABLE III (7/)

Types of requests

1. Demands for specific documents: the commonest kind of demand, necessitating an adequate collection of bibliographical reference works for ensuring accurate references.

2. Demands for specific data; properties, formulae, etc. requiring data books in the relevant subject fields.

3. Retrospective searches: the emphasis here is on "all relevant references", and a good collection of abstracting and indexing services is essential.

4. Current-awareness demands; the chief requirement for which is a good collection of current periodicals which the user may search himself plus, perhaps some form of selective dissemination service run by the library.

5. Exhaustive search demands; an extension of 3 above, usually required when the user needs to know that something definitely does not exist, as in patent searches.

6. Searches for research ideas; can only be carried out by the user himself, and often lead to other demands (see 1 through 5 above).

Each manager of a documentation center must decide how best to allocate his resources, in information sources and services, to meet his users' needs. These have to be individual decisions, to meet individual cases, but there are a few general remarks that can be made.

For instance, although it may sound like heresy to an audience of documentalists, I think that an important part of the budget should go towards buying books. Books may seem expensive, but I submit that they are the largest single bargain in the technical information field. I suggest also that the place for these books is in the library or on the desks of the scientists and engineers who are using them. I recently visited the Defense Research and Development Laboratory of one of the NATO countries. I was struck by the bareness of the library shelves, and asked the young lady in charge, "Don't you have any books?"

"Oh yes, sir", she said, "but they're all in the Director's office."

And sure enough, there they were, forming an impressive backdrop to his equally impressive desk.

And, get to know your users! They are your best aides in deciding what materials to buy. What is even more important, they can be your best allies in your chronic struggles with management, which never seems to understand the problems of the library--probably because, since they have so little time for personal reading, they tend to be functional illiterates.

The person who best knows what he needs in scientific and technical information is the user, but that the person who can know almost as much about the users' needs is the librarian or documentalists in day to day working contact with the user. I have occasionally expressed this as an equation, "P x R = K," where P is the personal involvement of the documentalist, and R the resources at his or her disposal; K of course being the user satisfaction. Unfortunately, in my experience, personal involvement and resources tend to vary inversely and I would far rather work with a motivated documentalist than to approach a large impersonal centralized information institute.

One of the most effective developmental technical information activities I have ever seen is in the Indian armies radar research and development establishment, LRDE, in Bangalore, India. I do not attribute this success to either their use of colon classification or the absence of a computer. LRDE has six component laboratories. A young scientist or engineer employed by the library is assigned to act as liaison between the library and each separate laboratory. He spends half of his time in the library keeping track of the incoming literature. The other half of his time in the laboratory talking to the scientists and engineers, telling them what he has found, and finding out what they are interested in knowing. To a civil servant the most convincing testimonial to this system is the fact that when a cut-back in library personnel was threatened the laboratories said: "Oh, no. You can't fire those people. They are ours!"

I have very carefully avoided talking about the tools of the documentalists' trade--classification systems, abstracting, indexing, mechanization. These are means, not ends. An overpreoccupation with these tools and techniques as ends in themselves can promote such situations as those described by Lester Asheim, of the American Library Association, in his recent book, "Librarianship in Developing Countries". (9/) He is writing of the American librarian abroad who, when he comes to special libraries: "May suddenly find the kind of library with which he is more familiar...In a country where there seems to be little organised information and small demand for it, suddenly he finds advanced systems of information retrieval; in a country where even the simplest of card catalogs is seldom provided, he finds centers of documentation at an advanced stage

of development; in a country where the 'librarian' of most institutions has no professional training and exhibits no interest in the field, he finds Ph.D's from the leading graduate library schools of Europe and the United States."

Asheim goes on to say: "It is difficult to know whether to be delighted or disturbed; are these libraries and information centers really serving a purpose, or are they merely an empty symbol, necessary to the desired national image, which must have a twentieth century surface despite the seventeenth-century reality behind it?"

L'ENVOI

In all too short a time I have tried to describe the industrial environment, and the policies which are needed if innovative industry is to flourish; I have discussed the ways in which scientists and engineers in industry go about getting the information they need, and hinted that at least in this respect documentalists may be sans peur, but certainly not sans reproche; and have mentioned certain practical aspects of operating documentation or information systems in industry.

To some, my emphasis on the importance of oral and informal communication may leave no role for formal documentation. I remind them that the first step in overcoming problems is to recognize their existence. I am prepared to argue that more frequent use of information outside the local environment, and a greater disposition toward seeking information in the formal literature would have a beneficial impact on the development of science and technology; would reduce the rate of obsolescence of technical skills; would like together the results of work done in separate organizations or in diverse fields; and hence would accelerate the transfer of technology from field to field and from place to place.

As Alfred North Whitehead observed more than forty years ago "the discovery of how to set about bridging the gap between the scientific idea and the ultimate product" was an important element of the nineteenth century's "invention of the method of invention". We as documentalists could try to bridge that gap by using documents as fascines; dead bundles to fill ditches. I don't recommend it, though it's been tried, and hasn't worked. There must be better ways of doing the job.

It is not too difficult to change the way in which an individual document centre or library does things; the difficulty goes up exponentially with the number of units which must be tied into a network, and

particularly if it is to be a national or international network. And to those who would establish firm policies, and freeze design at too early a date, I offer the following quotation from Emily Hahn's new book (10/) - from a sign to be found in the Zoological Gardens in Dehiwala, Ceylon:

> "East is East and West is West,
> Though this may not seem relevant.
> We all know how to milk a cow,
> But you can't muck about with an elephant."

Harold Wooster
7 November, 1967

Arlington, Virginia

REFERENCES

1. In "Applied Science and Technological Progress--A report to the Committee on Science and Astronautics, U.S. House of Representatives" by the National Academy of Sciences. Washington, D.C. June, 1967.

2. Excerpted from "Basic Research, Applied Research and Development in Industry, 1964" National Science Foundation, Washington, D.C. 1966. NSF 66-28.

3. "Peruvian Managers' Opinions on Problems of Industrialization" S Bradfield and A Del Aguila. Technical Report, Kalamazoo College, Michigan, 1967.

4. Newsletter of the International Computation Centre, Intergovernmental Bureau For Information Technology. Nos 50-52, July-September 1967.

5. "Technology, Information and Organization; Information Transfer in Industrial R & D". Harvard University Graduate School of Business Administration and Wharton School of Finance and Commerce, University of Pennsylvania. Supported by the Office of Science Information Services, National Science Foundation, under Grant GN-305.

6. "Research on Users' Needs; Where Is It Getting Us?" C.W. Hanson: Aslib Proceedings 16, 64-78 (1964).

7. "The Process of Professional Information Exchange Among Science Information Specialists" George E. Rowland, et al. National Science Foundation, Washington, D.C. 1967. PB 175 568.

8. Excerpted from "Dissemination of Information". T.D. Wilson & James Stephenson. Philosophical Library, New York. 1966.

9. "Librarianship in Developing Countries". Lester Asheim. University of Illinois Press, Urbana. 1966.

10. "Animal Gardens" Emily Hahn. Doubleday, New York 1967.

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13. ABSTRACT

The paper is divided into three parts (I) management of research and development in industry; (II) information transfer in industrial research and development, and (III) responsibilities of the documentalist in industry. (I) stresses that research and development can only flourish in a properly oriented national environment; (II) points out the heavy reliance of engineers on informal, oral internal sources of information, but says that documentalists aren't all that different (III) discusses the allocation of information sources and services to meet users' real or imagined needs. The author concludes with an admonitory note on the difficulties of establishing national information policies in developing countries: East is East and West is West//Though this may not seem relevant// We all know how to milk a cow//But you can't muck about with an elephant.

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